Student Name _____

Teacher Name _____

School _____

System _____

ELSA ALGEBRA I

ITEM SAMPLER

Tennessee End of Course Assessment
English Linguistically Simplified Assessment
Algebra I

Developed and published under contract with State of Tennessee Department of Education by the Educational Measurement group of Pearson, a business of NCS Pearson, Inc., 2510 North Dodge Street, Iowa City, Iowa 52245.

Mathematics Reference Page

Abbreviations for Geometric Formulas

A = area	d = diameter	r = radius
B = area of base	h = height	s = length of side
b = base	ℓ = length	V = volume
C = circumference	P = perimeter	w = width

Perimeter (P) and Circumference (C)

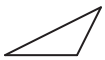
Any Polygon: P = sum of side lengths

Rectangle: $P = 2\ell + 2w$

Circle: $C = 2\pi r$ or πd

$\pi \approx 3.14$ or $\frac{22}{7}$

Plane Figures — Area (A)

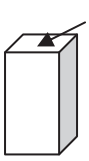
Triangle:  $A = \frac{1}{2}bh$

Rectangle:  $A = \ell w$

Circle:  $A = \pi r^2$

$\pi \approx 3.14$ or $\frac{22}{7}$

Solid Figures — Volume (V)

Right Rectangular Prism: 

$V = Bh$ or $V = \ell wh$

Cube:  $V = s^3$

Algebraic Formulas and Equations

$d = rt$ distance = rate × time

Distance Formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

d = distance between two points

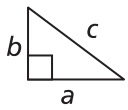
Midpoint Formula: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Standard Form of a Linear Equation: $Ax + By = C$

Slope-Intercept Equation: $y = mx + b$

Point-Slope Equation: $y - y_1 = m(x - x_1)$

Pythagorean Theorem: $a^2 + b^2 = c^2$ 

Quadratics

For $ax^2 + bx + c = 0$: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Discriminant: $b^2 - 4ac$

Measurement Conversions

LENGTH

1 foot (ft) = 12 inches (in.)
1 yard (yd) = 3 feet
1 yard = 36 inches
1 mile = 1,760 yards
1 mile = 5,280 feet

CAPACITY

1 cup (c) = 8 fluid ounces (fl oz)
1 pint (pt) = 2 cups
1 quart (qt) = 2 pints
1 quart = 4 cups
1 gallon (gal) = 4 quarts

WEIGHT

1 pound (lb) = 16 ounces (oz)
1 ton (T) = 2,000 pounds

CONVERSION BETWEEN CUSTOMARY AND METRIC MEASUREMENT

1 yard = 0.9144 m
1 foot = 0.3048 m
1 inch = 2.54 cm
1 quart = 0.946 L
1 ounce = 28.35 g
1 lb = 0.45 kg

Contents

Introduction to ELSA Algebra I

TCAP English Linguistically Simplified Assessment (ELSA)

The End of Course English Linguistically Simplified Assessment (ELSA) is the End of Course Assessment in "simplified" English. It is a multiple-choice test designed to measure student achievement in certain skills in two content areas: Algebra I and English II. The questions in this online Item Sampler are examples of items used in the actual test.

ELSA test questions

Questions are written to test student performance in state content standards. The State Content Standards and Performance Indicators were developed by the Tennessee Department of Education. These Standards and Performance Indicators are listed on the State Department of Education Web site at http://www.state.tn.us/education/curriculum.shtml.

Test accommodations

The End of Course English Linguistically Simplified Assessment may be administered using various procedures that are used during the student's daily educational program. Certain conditions must be met for students to be eligible for Special and English Language Learner (ELL) accommodations.

Content of End of Course tests

The testing program titled the *Tennessee End of Course Assessment* was established to meet the Tennessee mandate for end of course assessments in Tennessee secondary schools. These tests measure the Tennessee Performance Indicators. Subject areas covered by the testing program include Mathematics, Language Arts, History, and Science.

Test development

For the *Tennessee End of Course Assessment*, a staff of writers—composed of both teachers and professional test developers experienced in each of the content areas—researched and wrote the items. Professional editors and content specialists carefully reviewed all items and test directions for content and accuracy. To provide a large pool of items for final test selection, the test developers created approximately twice as many items as were needed in the final editions of the tests.

After tryout tests were administered, student responses were analyzed. Professional content editors and researchers carefully reviewed items, their data, and test directions for content, suitability, and accuracy before including particular items and test directions in operational tests.

Test administration

Tennessee End of Course Assessments are given to students as they near the end of courses that are included in the program. Students who are Limited English Proficient (LEP) will be tested using the ELSA test form. Tests may be given midyear for block schedules or near the end of the school year.

This test contains 65 multiple-choice questions.

Students will have ample time to read and answer each of the questions. The ELSA Algebra I test has been designed to be administered in one session and is not timed.

Calculator use is optional. Sharing calculators during testing is not permitted.

The following types of calculators/devices may **NOT** be used during the test:

- pocket organizers
- electronic writing pads or input devices
- Some examples of prohibited calculators are:
  - Casio models: CFX-9970G, Algebra FX 2.0
  - Hewlett-Packard models: HP-40G, HP-49G
  - Texas Instruments models: TI-89, TI-92, Voyage 200, TI-NSPIRE - the CAS version (The non-CAS version of TI-NSPIRE is allowable.)
- calculators that can communicate (transfer data or information) wirelessly with other student calculators/devices
- cell phones, PSPs, and/or iPods

Students may use any four-function, scientific, or graphing calculator that does not have any of the above features. The use of units that have a Computer Algebra System (CAS) is NOT allowed.

Tips for Taking the Test

Preparing for the test

- Review this Tennessee End of Course Item Sampler for Algebra I carefully and thoroughly.
- Acquire a Tennessee ELSA End of Course Practice Test for Algebra I, and take the test several times.
- Become familiar with the correct way to mark answers on the answer sheet. There is a sample answer sheet in the Practice Test.

Before the test

- Get a good night's sleep. To do your best, you need to be rested.

During the test

- Relax. It is normal to be somewhat nervous before the test. Try to relax and not worry.
- Listen. Listen to and read the test directions carefully. Ask for an explanation of the directions if you do not understand them.
- Plan your time. Do not spend too much time on any one question. If a question seems to take too long, skip it and return to it later. Answer all questions you are sure of first.
- Think. If you are not sure how to answer a question, read it again and try your best to answer the question. Rule out answer choices that you know are incorrect and choose from those that remain.

Directions for Using the Item Sampler

This Item Sampler for ELSA Algebra I provides specific information to students and teachers. It contains examples of different item types for each Performance Indicator that may be tested in any given end of course test administration. Performance Indicators have been grouped under Reporting Categories. These Reporting Categories will be used to report information regarding performance on the end of course tests to students, teachers, schools, and systems.

The items in this Item Sampler will not be found in the end of course tests. The number of items in this Item Sampler does not reflect the emphasis of content on the test. In order to identify the emphasis of content, the ELSA End of Course Assessment Practice Test for Algebra I should be used. The Practice Test gives a better representation of content emphasis across Reporting Categories and Performance Indicators.

An Answer Key is located on Page 31. Use it to check your answers. Review items that you get wrong.

Reporting Category: Mathematical Processes
Numbers 1 through 6

Performance Indicator: Interpret patterns found in sequences, tables, and other forms of quantitative information using variables or function notation.

1 Which function represents the data shown in this chart?

x	$f(x)$
1	11
2	20
3	29
4	38
5	47

A $f(x) = 9x$
B $f(x) = x + 9$
C $f(x) = 9x + 2$
D $f(x) = 2x + 9$

GM040008-E

Performance Indicator: Write an equation symbolically to express a contextual problem.

2 Shayla wants to calculate her target heart rate, r.

- She subtracts her age, y, from 220.
- Then she finds 70% of the difference.

Which equation should Shayla use to calculate her target heart rate?

F $r = 0.7(y - 220)$
G $r = 0.7(220 - y)$
H $r = 0.7(220) - y$
J $r = 220 - 0.7(y)$

GM040094-E

Go On ▶

Performance Indicator: Apply properties to evaluate expressions, simplify expressions, and justify solutions to problems.

3 **Simplify:**

$$2(7x - 2y) + 6x - 7(x - 3y)$$

A $8x - y$
B $8x - 7y$
C $13x + 25y$
D $13x + 17y$

GM040009-E

Performance Indicator: Translate between representations of functions that depict real-world situations.

4 An airport taxi service can take people to three different locations. The costs are shown in this chart:

Airport Taxi Cost

Location	Distance (miles), *d*	Cost, *c*
X	3	$10
Y	4	$12
Z	6	$16

Which equation correctly shows the relationship between the cost, *c*, and the distance, *d*, of a taxi ride?

F $c = 3d - 2$
G $c = 3d + 1$
H $c = 2d - 4$
J $c = 2d + 4$

GM040096-E

Go On ▶

Performance Indicator: Recognize and express the effect of changing constants and/or coefficients in problem solving.

5 When Raul runs, he does a 0.5-mile warm-up. The total number of miles Raul runs, R, is represented by this equation.

$$R = 6t + 0.5$$

When Ben runs, he does a 0.25-mile warm-up. The total number of miles Ben runs, B, is represented by this equation.

$$B = 5t + 0.25$$

In each equation, t represents the time in hours after each runner's warm-up. Which statement best compares Raul's speed to Ben's speed?

A Raul's speed is 1 mile per hour faster than Ben's.
B Raul's speed is 3 miles per hour faster than Ben's.
C Raul's speed is 1 mile per hour slower than Ben's.
D Raul's speed is 3 miles per hour slower than Ben's.

GM040119-E

Performance Indicator: Determine and interpret slope in multiple contexts including rate of change in real-world problems.

6 Richard works at a computer store. The equation $y = 25x + 56$ can be used to find his daily earnings, y, when he sells x computers. What is represented by the slope in this equation?

F the total amount of money Richard earns each day
G the total number of computers Richard sells each day
H the amount of money Richard earns if he sells no computers
J the amount of money Richard earns for each computer he sells

GM040015-E

Go On ▶

Reporting Category: Number and Operations
Numbers 7 through 9

Performance Indicator: Operate (add, subtract, multiply, divide, simplify, powers) with radicals and radical expressions including radicands involving rational numbers and algebraic expressions.

7 If the value of the variable y is positive, what is the sum of $5\sqrt{2y}$ and $\sqrt{2y}$?

A $5\sqrt{2y}$
B $6\sqrt{2y}$
C $5\sqrt{4y}$
D $6\sqrt{4y}$

GM040054-E

Performance Indicator: Multiply, divide, and square numbers expressed in scientific notation.

8 A light-year is about 9.46×10^{12} kilometers. A galaxy is about 2.0×10^{6} light-years from Earth. How many kilometers is this galaxy from Earth?

F 1.892×10^{19}
G 1.892×10^{18}
H 1.146×10^{19}
J 1.146×10^{18}

GM040104-E

Performance Indicator: Describe and/or order a given set of real numbers including both rational and irrational numbers.

9 Which list shows the numbers in order from greatest to least?

A $\sqrt{11}$, 4.1, 4.065, 2.5
B 4.1, 4.065, $\sqrt{11}$, 2.5
C $\sqrt{11}$, 4.065, 4.1, 2.5
D 4.1, 4.065, 2.5, $\sqrt{11}$

GM040219-E

Go On ▶

Reporting Category: Algebra
Numbers 10 through 20

Performance Indicator: Express a generalization of a pattern in various representations including algebraic and function notation.

10 The first 3 figures in a pattern are shown.

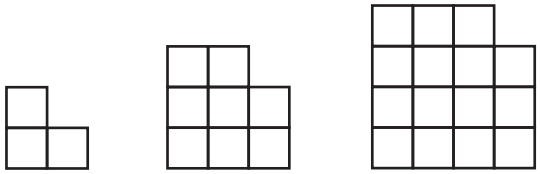


Figure 1 **Figure 2** **Figure 3**

□ = 1 small square

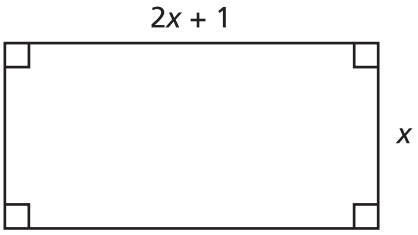
Which function represents $f(n)$, the number of small squares in Figure n?

F $f(n) = n^2 - 1$
G $f(n) = 2n^2 + 1$
H $f(n) = (n+1)^2 + 1$
J $f(n) = (n+1)^2 - 1$

GM040156-E

Performance Indicator: Operate with polynomials and simplify results.

11 The length and width of a rectangle are represented in the figure shown.



$A = \ell w$

Which equation represents the area (A) of the rectangle in terms of x?

A $A = 2x^2 + 1$
B $A = 2x^2 + x$
C $A = 4x^2 + 4x + 1$
D $A = 4x^3 + 4x^2 + x$

GM040306-E

Performance Indicator: Factor polynomials.

12 **Factor:** $x^3 + 3x^2 + 2x + 6$

F $x(x^2 + 3x + 8)$
G $x(x^2 + 3x + 2)$
H $(x + 3)(x^2 + 2)$
J $(x + 2)(x^2 + 3)$

GM040130-E

Go On ▶

Performance Indicator: Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.

13 Simplify $\frac{x^2 + 4x - 5}{x^2 - 5x + 6} \bullet \frac{x^2 - x - 6}{x^2 - 6x + 5}$ for all values of x for which the expression is defined.

A -1

B 1

C $\frac{x^2 + 7x + 10}{x^2 - 7x + 10}$

D $\frac{x^2 - 7x + 10}{x^2 + 7x + 10}$

GM040184-E

Go On ▶

Performance Indicator: Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.

14 Which statement represents the solution to this compound inequality?

$$-6x - 5 \leq -15 \text{ or } -3x + 28 \geq 52$$

F $-8 \leq x \leq 1\frac{2}{3}$

G $-26\frac{2}{3} \leq x \leq 3\frac{1}{3}$

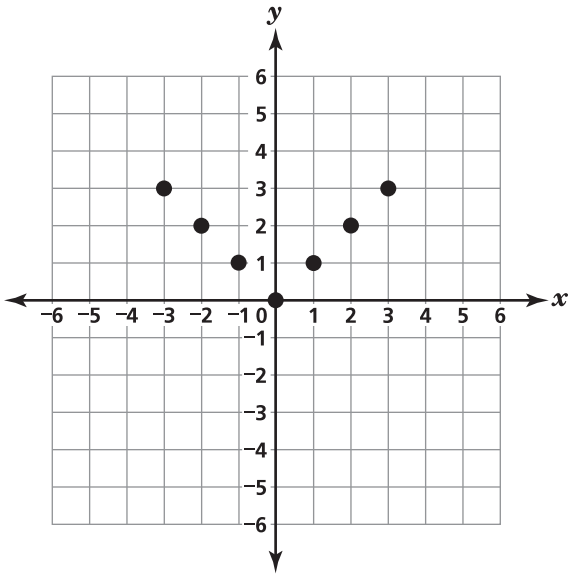
H $x \leq -8$ or $x \geq 1\frac{2}{3}$

J $x \leq -26\frac{2}{3}$ or $x \geq 3\frac{1}{3}$

GM040237-E

Performance Indicator: Interpret various relations in multiple representations.

15 Look at this relation.

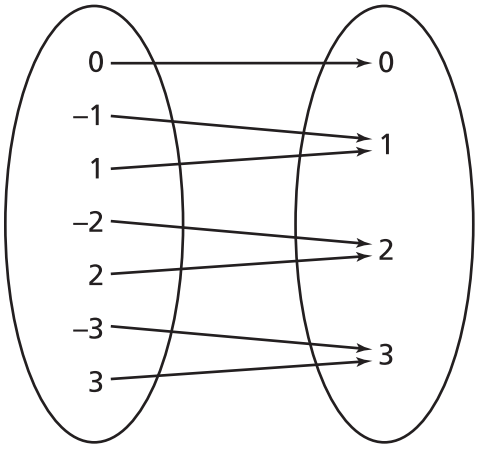


Which is not an equivalent representation of this relation?

A $y = x^2$

B $\{(-3, 3), (-2, 2), (-1, 1), (0, 0), (1, 1), (2, 2), (3, 3)\}$

C



D

x	*y*
0	0
–1	1
1	1
–2	2
2	2
–3	3
3	3

GM040284-E

Performance Indicator: Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.

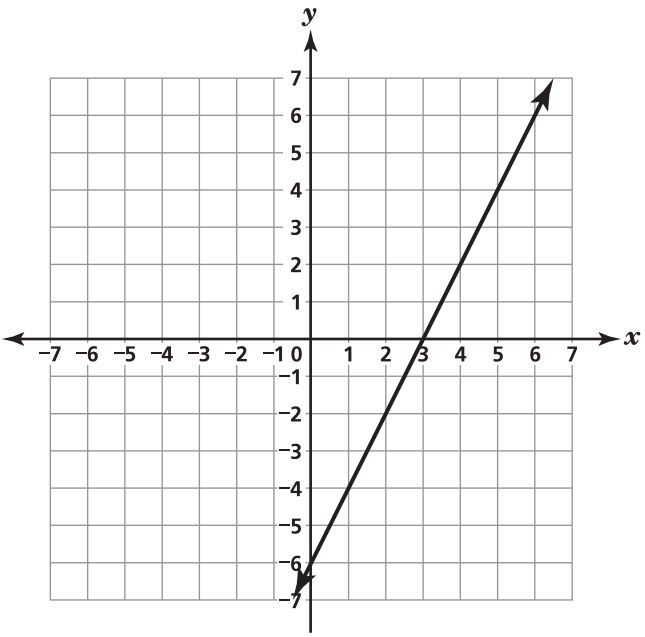
16 The function $h(t) = 100 - 16t^2$ represents h, the height, in feet, of an object t seconds after it is dropped from the roof of a building. What is the height of a ball 1.5 seconds after it has been dropped from the roof of this building?

F 24 feet
G 64 feet
H 76 feet
J 84 feet

GM040290-E

Performance Indicator: Determine the equation of a line and/or graph a linear equation.

17 Which equation best represents the graph of the line?



A $2x - y = 6$
B $2x + y = 6$
C $6x + y = 3$
D $3x - 6y = 0$

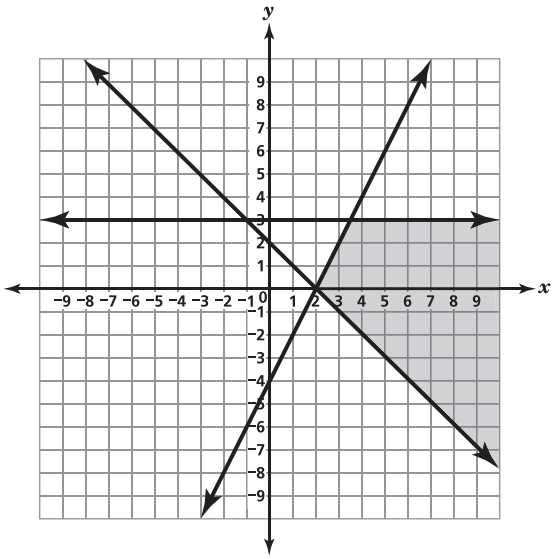
GM040151-E

Go On ▶

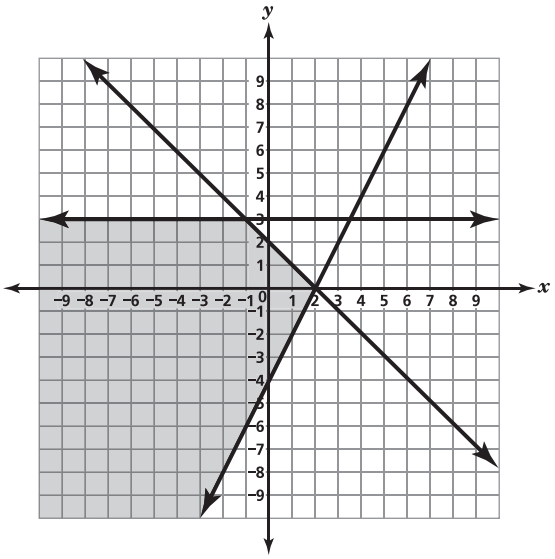
Performance Indicator: Solve systems of linear equations/inequalities in two variables.

18 Which graph best represents the solution to the system of linear inequalities?

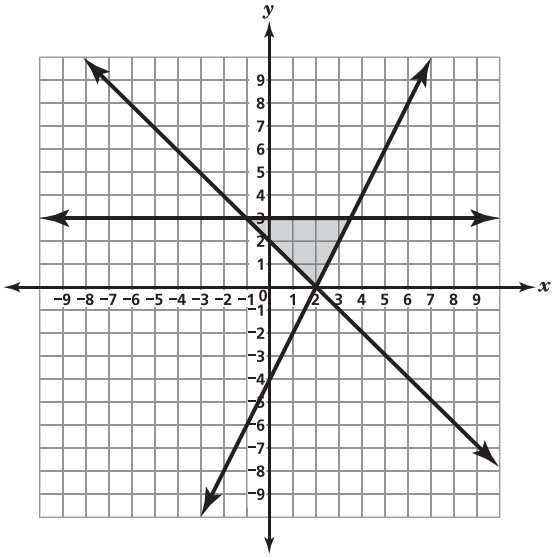
$$4x - 2y \leq 8$$
$$x + y \geq 2$$
$$y \leq 3$$



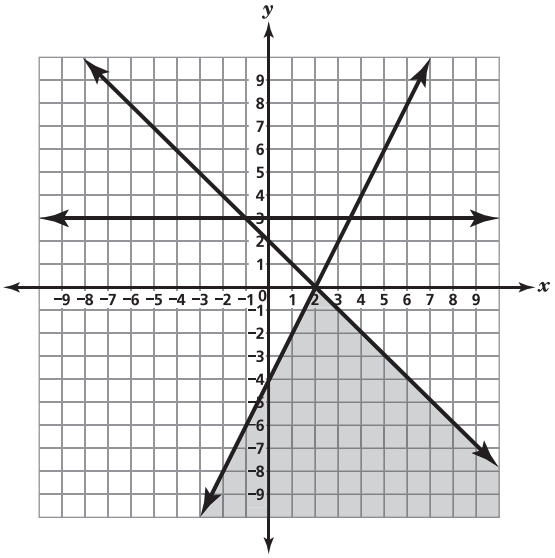
F



H



G



J

Performance Indicator: Find the solution of a quadratic equation and/or zeros of a quadratic function.

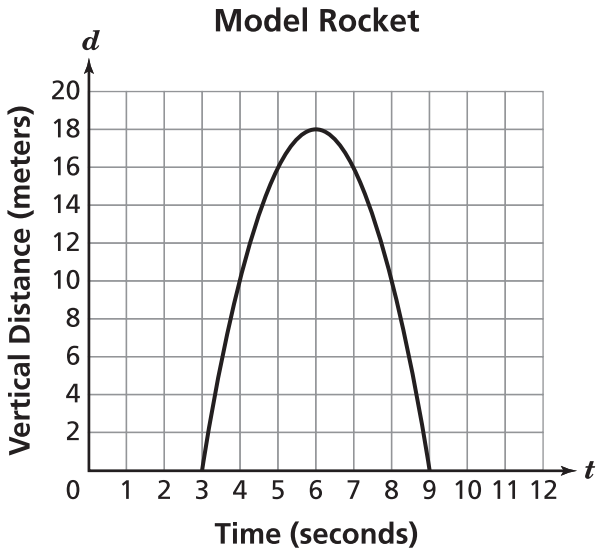
19 **Solve:** $x^2 + 15 = -10x - 10$

A $x = 5$
B $x = -5$
C $x = \sqrt{15}$
D $x = -\sqrt{15}$

GM040030-E

Performance Indicator: Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

20 A 3-second countdown happens. Then, a rocket launches from the ground. The parabola shown represents *d*, the vertical distance, in meters, of the rocket as it travels for *t* seconds.



When the rocket has traveled for 1.25 seconds, it has a certain vertical distance from the ground. How many more seconds pass until the rocket returns to this same vertical distance?

F 1.75
G 3.00
H 3.50
J 6.50

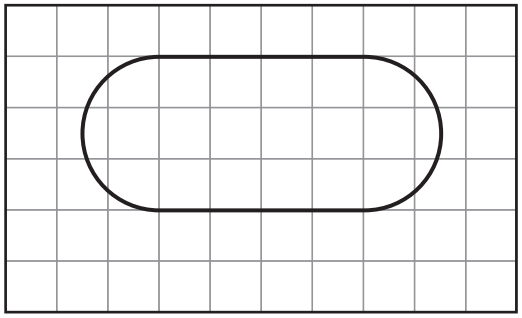
GM040274-E

Go On ▶

Reporting Category: Geometry and Measurement
Numbers 21 through 24

Performance Indicator: Develop and apply strategies to estimate the area of any shape on a plane grid.

21 Which is closest to the area of the figure?



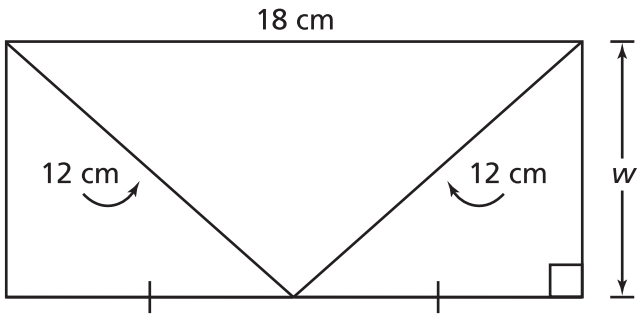
= 1 square unit

A 7 square units
B 12 square units
C 19 square units
D 21 square units

GM040031-E

Performance Indicator: Solve contextual problems using the Pythagorean Theorem.

22 The measurements on the rectangular envelope are shown in centimeters (cm).



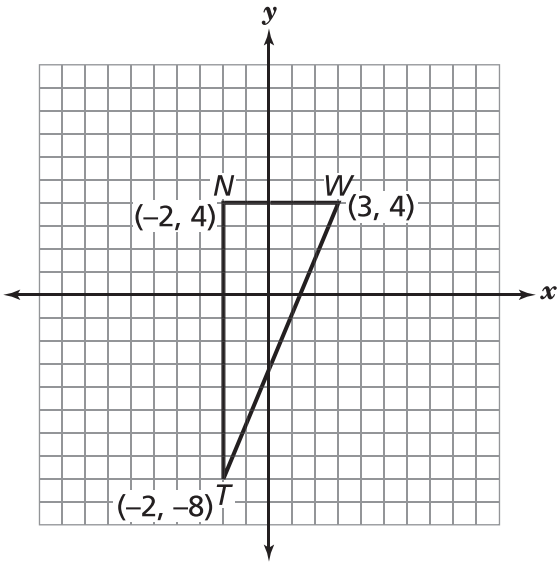
What is w, the width of the envelope, in centimeters (cm)?

F $3\sqrt{7}$
G $6\sqrt{5}$
H $6\sqrt{13}$
J $12\sqrt{2}$

GM040076-E

Performance Indicator: Solve problems involving the distance between points or midpoint of a segment.

23 What is the perimeter of $\triangle NWT$?



A 13 units
B 17 units
C 21 units
D 30 units

GM040244-E

Performance Indicator: Convert rates and measurements.

24 The regular price of a type of fabric is $6.99 per yard. The sale price of this fabric is $4.89 per yard. Which is closest to the difference between the regular price per inch and the sale price per inch for this fabric?

F 5.8 cents per inch
G 11.7 cents per inch
H 13.6 cents per inch
J 17.5 cents per inch

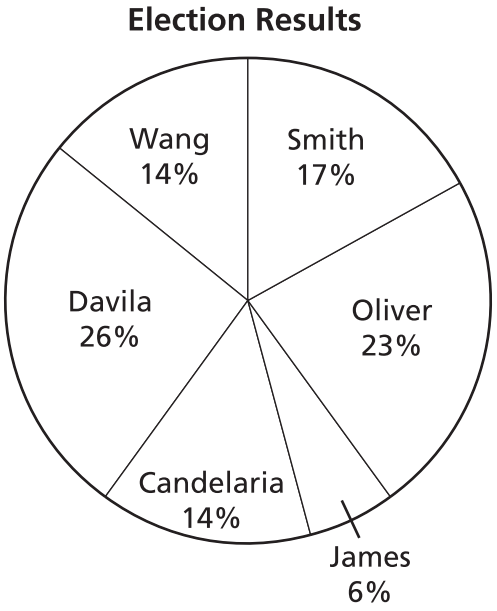
GM040167-E

Go On ▶

Reporting Category: Data Analysis, Statistics, and Probability
Numbers 25 through 29

Performance Indicator: Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).

25 A total of 200 votes were cast in an election. The circle graph shows the percentage of votes received by each candidate running for class president.



Which statement is not supported by the data in the graph?

A Davila wins the election with 26 votes.
B James has less than half the number of votes as Candelaria.
C Almost half of the votes went to Davila and Oliver combined.
D Smith and James combined have the same number of votes as Oliver.

GM040246-E

Performance Indicator: Identify the effect on mean, median, mode, and range when values in the data set are changed.

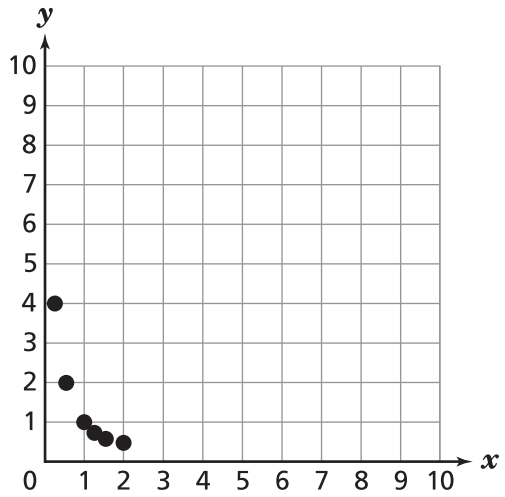
26 The range of a data set is 12. Every value in the data set is multiplied by 3 to create a new data set. What is the range of the new data set?

F 4
G 15
H 27
J 36

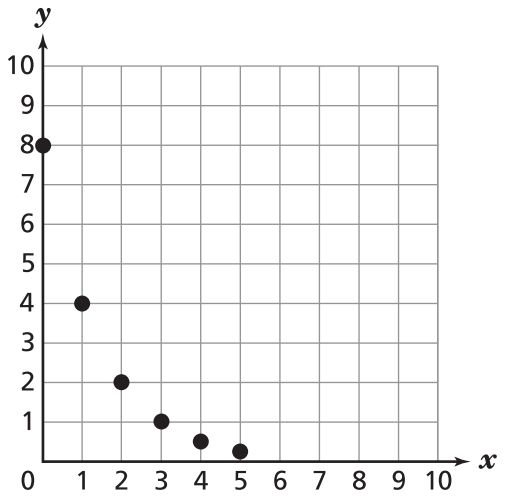
GM040295-E

Performance Indicator: Using a scatterplot, determine if a linear relationship exists and describe the association between variables.

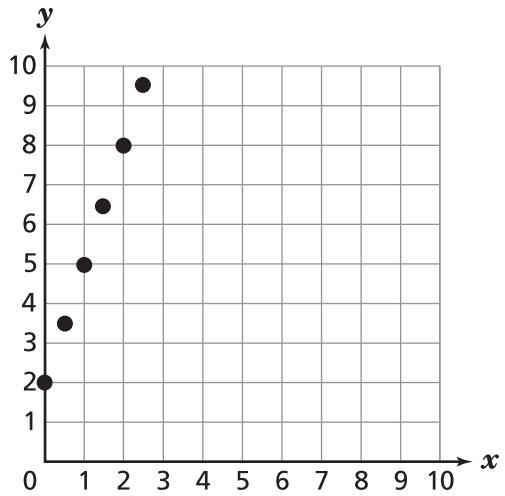
27 Which graph shows a negative linear relationship between the variables *x* and *y*?



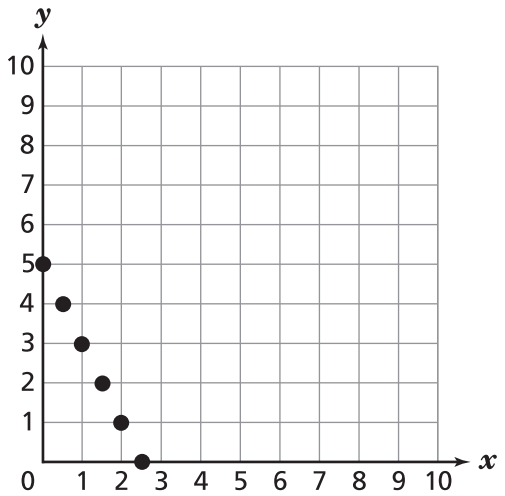
A



C



B



D

GM040311-E

Performance Indicator: Generate the equation of a line that fits linear data and use it to make a prediction.

28 The chart below shows the relationship between *t*, the winning time for an event in the Olympics and *y*, the number of years after 1900.

Results

Year of Olympic Games	Years after 1900, *y*	Winning Time, *t* (in seconds)
1900	0	11.0
1912	12	10.8
1924	24	10.6
1936	36	10.3
1948	48	10.3
1960	60	10.2
1972	72	10.14
1984	84	9.99
1996	96	9.84

If the trend continues, which is the best prediction of the winning time, for this event in the 2020 Olympics?

F 8.94 seconds
G 9.30 seconds
H 9.54 seconds
J 9.82 seconds

GM040144-E

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Performance Indicator: Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.

29 The names of 17 high school students are written on pieces of paper that are the same size. Then, the pieces of paper are placed in a box.

- Eight of these students are seniors.
- Four of these students are juniors.
- Five of these students are sophomores.

One piece of paper is taken out of the box. What is the probability that this piece of paper does not have the name of a sophomore written on it?

A $\frac{5}{17}$

B $\frac{8}{17}$

C $\frac{12}{17}$

D $\frac{13}{17}$

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STOP

Answer Key with Reporting Category and Performance Indicator

Reporting Category 1: Mathematical Processes		
Item Number	**Correct Answer**	**Performance Indicator**
1	**C**	3102.1.1 Interpret patterns found in sequences, tables, and other forms of quantitative information using variables or function notation.
2	**G**	3102.1.2 Write an equation symbolically to express a contextual problem.
3	**D**	3102.1.3 Apply properties to evaluate expressions, simplify expressions, and justify solutions to problems.
4	**J**	3102.1.4 Translate between representations of functions that depict real-world situations.
5	**A**	3102.1.5 Recognize and express the effect of changing constants and/or coefficients in problem solving.
6	**J**	3102.1.6 Determine and interpret slope in multiple contexts including rate of change in real-world problems.

Reporting Category 2: Number and Operations		
Item Number	**Correct Answer**	**Performance Indicator**
7	**B**	3102.2.1 Operate (add, subtract, multiply, divide, simplify, powers) with radicals and radical expressions including radicands involving rational numbers and algebraic expressions.
8	**F**	3102.2.2 Multiply, divide, and square numbers expressed in scientific notation.
9	**B**	3102.2.3 Describe and/or order a given set of real numbers including both rational and irrational numbers.

Reporting Category 3: Algebra		
Item Number	**Correct Answer**	**Performance Indicator**
10	**J**	3102.3.1 Express a generalization of a pattern in various representations including algebraic and function notation.
11	**B**	3102.3.2 Operate with polynomials and simplify results.
12	**H**	3102.3.3 Factor polynomials.
13	**C**	3102.3.4 Operate with, evaluate, and simplify rational expressions including determining restrictions on the domain of the variables.
14	**H**	3102.3.5 Write and/or solve linear equations, inequalities, and compound inequalities including those containing absolute value.
15	**A**	3102.3.6 Interpret various relations in multiple representations.
16	**G**	3102.3.7 Determine domain and range of a relation, determine whether a relation is a function and/or evaluate a function at a specified rational value.
17	**A**	3102.3.8 Determine the equation of a line and/or graph a linear equation.
18	**G**	3102.3.9 Solve systems of linear equations/inequalities in two variables.
19	**B**	3102.3.10 Find the solution of a quadratic equation and/or zeros of a quadratic function.
20	**H**	3102.3.11 Analyze nonlinear graphs including quadratic and exponential functions that model a contextual situation.

Reporting Category 4: Geometry and Measurement		
Item Number	**Correct Answer**	**Performance Indicator**
21	**C**	3102.4.1 Develop and apply strategies to estimate the area of any shape on a plane grid.
22	**F**	3102.4.2 Solve contextual problems using the Pythagorean Theorem.
23	**D**	3102.4.3 Solve problems involving the distance between points or midpoint of a segment.
24	**F**	3102.4.4 Convert rates and measurements.

Reporting Category 5: Data Analysis, Statistics, and Probability		
Item Number	**Correct Answer**	**Performance Indicator**
25	**A**	3102.5.1 Interpret displays of data to answer questions about the data set(s) (e.g., identify pattern, trends, and/or outliers in a data set).
26	**J**	3102.5.2 Identify the effect on mean, median, mode, and range when values in the data set are changed.
27	**D**	3102.5.3 Using a scatterplot, determine if a linear relationship exists and describe the association between variables.
28	**H**	3102.5.4 Generate the equation of a line that fits linear data and use it to make a prediction.
29	**C**	3102.5.5 Determine theoretical and/or experimental probability of an event and/or its complement including using relative frequency.